REMARKS

Claims 1-13 are all the claims presently pending in the application. Claims 11-13 have been added to claim additional features of the invention.

It is noted that the claims have been amended solely to more particularly point out Applicant's invention for the Examiner, and not for distinguishing over the prior art, narrowing the claim in view of the prior art, or for statutory requirements directed to patentability.

It is further noted that, notwithstanding any claim amendments made herein, Applicant's intent is to encompass equivalents of all claim elements, even if amended herein or later during prosecution.

Attached hereto is a marked-up version of the changes made to the Specification and/or claims by the current Amendment. The attached pages are captioned "**Version with markings to show changes made**".

Claims 1-4 and 6-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the conventional arts admitted by applicants in view of Knop, et al. (U.S. Patent No. 4,251,137) (hereinafter "Knop").

Claim 5 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over the conventional arts admitted by applicants in view of Bradshaw, et al. (U.S. Patent No. 6,016,180A) (hereinafter "Bradshaw"), as applied to claim 1, in further view of Ohe et al. (U.S. Patent No. 6,295,110B1) (hereinafter "Ohe").

These rejections are respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

Applicant's invention, as defined for example in a non-limiting embodiment of independent claim 1 (and substantially similarly by independent method claim 7) is directed to a liquid crystal display device including a first substrate formed with display pixel electrodes thereon, the first substrate having a first irregular surface including line-shaped protrusions extending in one direction.

A second substrate is arranged in an opposing relation to the first substrate and includes a second irregular surface including line-shaped protrusions extending perpendicularly to the one direction.

Further, in the present invention, the line-shaped protrusions are formed due to a direction dependency of a thickness of a raw glass substrate.

With such features, a direction of thickness distribution or irregularity distribution of a first substrate becomes orthogonal to a direction of thickness or irregularity of a second substrate when, for example, the substrates are laid one on the other during a fabrication process of a liquid crystal display panel.

None of the cited references is pertinent at all to the claimed combination, and nowhere discloses or suggest the technical inventive concept of the present invention. Indeed, the present invention is based upon the fact that a direction dependency of a thickness of the raw glass substrate or mother board is unavoidable. Specifically, in a non-limiting embodiment as defined by independent claim 1 (and substantially similarly by independent claims 7), "*said line-shaped protrusions are formed due to a direction dependency of a thickness of a raw glass substrate*".

The present invention allows for an increase of a distance between positions at which the thick portions of the two substrates overlap and the thin portions of the two substrates overlap. Thus, a defect rate of the liquid crystal display panel due to the overlapping of thick portions and overlapping of thin portion causing a variation within a display is reduced.

The conventional systems, such as those discussed below and in the Related Art section of the present application, do not have such a structure, and fail to provide for such an operation (e.g., see page 6, lines 12-17; page 10, lines 13-18; page 11, lines 8-24; and page 12, lines 14-20; page 18, lines 21-27; and page 19, lines 1-10 of the present application).

Such features are not taught or suggested by any of the cited references.

II. THE PRIOR ART REFERENCE

A. The Knop Reference

The Examiner asserts:

> *[regarding claims 1-4 and 6-10] Knop et al. teach (Fig. 4, col. 3 line 59 to col. 4 line16) liquid crystal display device comprising the first substrate (grading substrate 402) having a first irregular surface including line-shaped protrusions extending in one direction; a second substrate 400 arranged in an opposing relation to said first substrate, said second substrate having a second irregular surface including line-shaped protrusions extending perpendicularly to said one direction for regulating contract ratio.*
>
> *Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify liquid crystal display device as applicants admitted with a first irregular surface including line-shaped protrusions extending in one direction; a second substrate arranged in an opposing relation to said first substrate, said second substrate having a second irregular surface including line-shaped protrusions extending perpendicularly to said one direction for regulating contrast ratio.*

However, Applicant respectfully disagrees.

Firstly, Knop, along with any of the other cited references, fails to teach or suggest and indeed is not pertinent to the present invention. Nowhere does Knop or the other cited references anticipate or suggest the novel present invention based upon the directional dependency of a thickness of a raw glass substrate or motherboard. In particular, nowhere does Knop (e.g., or Bradshaw and Ohe) disclose or suggest that "*line-shaped protrusions are formed due to a direction dependency of a thickness of a raw glass substrate*".

Instead, Knop merely shows a tunable diffractive-subtractive color filter for a projector. In Knop, the irregular surface of a first grating 400 and a second grating 402 as shown in Fig. 4 of Knop is obtained by purposely machining the grating structure surfaces. While the "*respective grating line grooves of relief patterns 406 and 408 are oriented substantially perpendicularly to each other. In Fig. 4, the index of refraction n_o of structures 400 and 402 may be selected to be substantially equal to the index of refraction n of liquid crystal 404*" (e.g., see column 4, lines 1-6 of Knop). The first grating 400 and the second

grating 402 of Knop are entirely different in structure than the first and second substrate of the present invention. Thus, it is no surprise that the object of Knop has nothing to do with "*line-shaped protrusions.....formed due to a direction dependency of a thickness of a raw glass substrate*". That is, in contrast to the present invention, the irregular surface of Knop is not intrinsic to a substrate. Again, Knop's irregular surface of the substrate must be formed affirmatively and purposely to provide the grating line grooves.

Hence, turning to the clear language of the claims, there is no teaching or suggestion of "*[a] liquid crystal display device comprising:*

a first substrate formed with display pixel electrodes thereon, said first substrate having a first irregular surface including line-shaped protrusions extending in one direction;

a second substrate arranged in an opposing relation to said first substrate, said second substrate having a second irregular surface including line-shaped protrusions extending perpendicularly to said one direction; and

liquid crystal disposed between said first substrate and said second substrate,

wherein said line-shaped protrusions are formed due to a direction dependency of a thickness of a raw glass substrate" (emphasis Applicant's).

For the reasons stated above, independent claim 1 (and substantially similarly independent claim 7) of the claimed invention are fully patentable over Knop.

Further, dependent claims 2-3, 6, and 9-10 when taken in combination with claims 1 and 7 define additional novel limitations.

Further, with regard to dependent claim 5, rejected under 35 U.S.C. 103(a) as being unpatentable over the "conventional art admitted by applicants" (to which Applicant is unsure of what specifically the Examiner is referring and thus traverses this rejection for this additional reason) in view of Bradshaw and further in view of Ohe, this claim provides additional limitations, which in combination with those of independent claim 1, are neither taught nor suggested by Bradshaw and Ohe, either alone or in combination with each other (or with Knop for that matter).

For example, Bradshaw either alone or even (arguendo) if combined with Ohe, does not teach or suggest the first and second substrates with line-shaped protrusions "*wherein said line-shaped protrusions are formed due to a direction dependency of a thickness of a*

raw glass substrate".

Instead, Bradshaw only discloses that "*a plurality of walls (14) is provided between the two substrates [12,16].....The walls may extend in two mutually different directions (FIG. 8, 40) to provide mechanical strength and resistance to flow in two directions...* " (e.g., see Abstract of Bradshaw). Thus, Bradshaw merely shows a plurality of walls on a substrate. Further, Ohe discloses an active matrix substrate "*employing a so-called "lateral electric field" scheme (also know as the IPS system)*" (e.g., see column 1, lines 47-48 of Ohe).

Therefore, these references either alone or in combination are much different from the present invention and fail to teach or suggest the claimed invention.

For the reasons stated above, the claimed invention is fully patentable over the cited references.

III. FORMAL MATTERS AND CONCLUSION

Regarding the drawings objection, Applicant notes that Figures 1A-1B, 2A-2B, and 3A-3B are "Related Art", not "Prior Art" as alleged by the Examiner. These Figures 1A-1B, 2A-2B, and 3A-3B were not necessarily published or known outside the confines of NEC Corporation prior to the filing date of the priority document, and hence cannot be used against the claims of the present application. Indeed, Applicant purposely avoided labeling Figures 1A-1B, 2A-2B, and 3A-3B as "Prior Art" to guard against such an eventuality. Thus, to label these Figures as "Prior Art" at this time would be erroneous.

Further, regarding the Examiner's objection to the drawings with reference to claim 3, Applicant notes that as shown in Fig. 7A and as clearly described in the specification (e.g., see page 13, lines 5-9), a TFT 503 is a switching element. Further, as shown in Fig. 7B and as clearly described in the specification (e.g., see page 13, lines 21-25), a matrix shaped light shield film 203 is provided on a second substrate 101 and a color layer 142 necessary for color display is formed on the light shield film 203. Further, regarding the Examiner's objection to the drawings with reference to claim 5, Applicant notes that as shown in Fig. 7A

and Fig. 7B and as clearly described in the specification (e.g., see page 13, lines 14-15), a common electrode 106 and a pixel electrode are arranged parallel to each other in an alternating sequence. Thus, Applicant respectfully submits that the drawings taken as a whole do show every feature of the claimed invention. It is noted that Rule 83(a) does not require that a single drawing show all claimed features.

In view of the foregoing, Applicant submits that claims 1-13, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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CERTIFICATION OF FACSIMILE TRANSMISSION

I hereby certify that I am filing this Amendment by facsimile with the United States Patent and Trademark Office to Examiner Hoan C. Nguyen, Group Art Unit 2871 at fax number (703) 872-9318 this 14th day of November, 2002.

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please amend the claims to read as follows:

1. (Amended) A liquid crystal display device comprising:

a first substrate formed with display pixel electrodes thereon, said first substrate having a first irregular surface including line-shaped protrusions extending in one direction;

a second substrate arranged in an opposing relation to said first substrate, said second substrate having a second irregular surface including line-shaped protrusions extending perpendicularly to said one direction; and

liquid crystal disposed between said first substrate and said second substrate,

wherein said line-shaped protrusions are formed due to a direction dependency of a thickness of a raw glass substrate.

2. (Amended) A liquid crystal display device as claimed in claim 1, wherein said first substrate and said second substrate have thickness distributions in which [thickness'] thicknesses thereof vary in one direction, respectively, and which are substantially orthogonal each other.

3. (Amended) A liquid crystal display device as claimed in claim 1, wherein said first substrate [is provided with] comprises switching elements for on-off controlling respective ones of said display pixel electrodes.

4. (Amended) A liquid crystal display device as claimed in claim 3, wherein each of said switching [element is] elements comprises a thin film transistor and said second substrate [is formed with] comprises a color filter.

5. (Amended) A liquid crystal display device as claimed in claim 1, wherein said first substrate [is provided with] comprises a common electrode arranged in parallel to said

display pixel electrodes to construct an active matrix substrate of an In-Plane Switching system.

6. (Amended) A liquid crystal display device as claimed in claim 1, wherein one of said first and second substrates has [the] a thickness distribution changing along a longer side direction thereof, the other substrate has [the] a thickness distribution changing along [the] a shorter side thereof and the changing direction of the thickness distribution of said one substrate is substantially orthogonal to the changing direction of the thickness distribution of [said] the other substrate.

7. (Amended) A fabrication method of a liquid crystal display device, comprising [the steps of]:

cutting apart a first rectangular substrate from a first raw glass substrate having a belt-shaped irregularity such that a longer side direction of said first rectangular substrate is coincident with a drawing direction of said first raw glass substrate;

cutting apart a second rectangular substrate from a second raw glass substrate having a belt-shaped irregularity such that a longer side direction of said second rectangular substrate becomes orthogonal to a drawing direction of said second raw glass substrate; and

arranging said first rectangular substrate in an opposing relation to said second rectangular substrate with a gap [enough] formed therebetween to accept a liquid crystal layer [between said first and second rectangular substrates] and with the longer sides of said first and second rectangular substrates being in the same direction,

wherein line-shaped protrusions are formed due to a direction dependency of respective thicknesses of said first and second raw glass substrates.

8. (Amended) A fabrication method of a liquid crystal display device, as claimed in claim 7, wherein pixel electrodes, a common electrode and switching elements connected to respective ones of said pixel electrodes are formed on one of said first and second rectangular substrates and a color filter is formed on [said] the other substrate.

9. (Amended) A fabrication method of a liquid crystal display device, as claimed in claim 7,

wherein a plurality of said first rectangular substrates are cut apart from said first raw glass substrate in [the step of] said cutting apart said first rectangular substrate and a plurality of said second rectangular substrates are cut apart from said second raw glass substrate in [the step of] said cutting apart said second rectangular [substrates] substrate,

said method further comprising before [the step of] said cutting said first and second rectangular substrates, [the step of] forming electrodes and switching elements on each of said first rectangular substrates and [the step of] forming a color filter layer on each of said second rectangular substrates.

10. (Amended) A fabrication method of a liquid crystal display device, as claimed in claim 8, further comprising [the steps of]:

printing a seal material on said first rectangular substrate;

dispersing spacers on a surface of said second rectangular substrate;

adhering said first rectangular substrate to said second rectangular substrate by arranging said first and second rectangular substrates in an opposing relation with said seal material and said spacers being inside and hardening said seal material while applying a constant pressure between said first and second rectangular substrates; and

injecting liquid crystal material into said gap between said first and second rectangular substrates.